

# Simulation Environment for Power Management and Distribution Development, Phase II

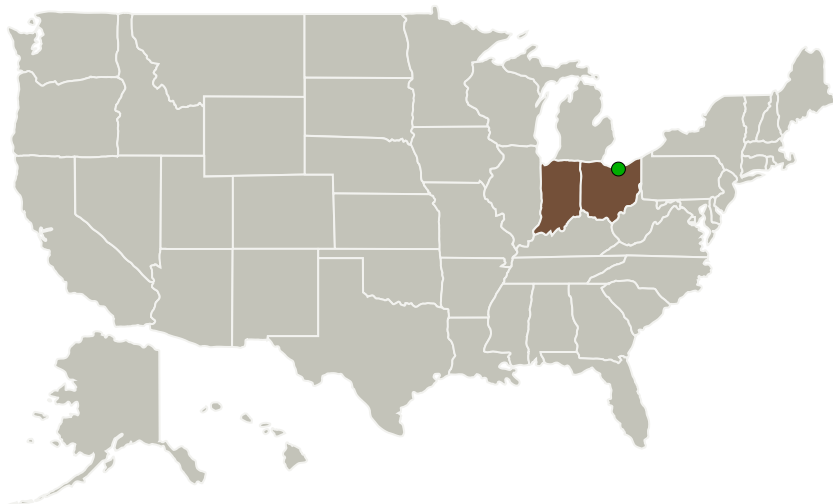
Completed Technology Project (2013 - 2016)



## Project Introduction

The overall objective of this research project is to investigate autonomous control architectures for spacecraft power systems. Such techniques will be critical for deep space missions that face inhospitable environments, unpredictable operating conditions, and communication delays. The distributed nature of agent-based control will also support plug-and-play capabilities for modular power systems. The first main focus of the Phase II effort is to expand and refine the International Space Station (ISS) model library created in the Phase I. This will enable advanced energy management studies by supporting the interconnection of multiple channels. In addition, hardware validation of both component and system models will be pursued. Finally, Distributed Heterogeneous Simulation will be applied to the system models to accelerate simulation speed. The second main focus of the Phase II will be to utilize the simulation environment to investigate agent-based autonomous controls. In particular, the ability of agent-based controls to perform in scenarios that stress conventional controls will be analyzed. This ability will also be examined when communication constraints (such as sample rates and latencies) and packet loss are present. Lastly, the ISS system model will be integrated with hardware agent emulators setting the stage for hardware experimentation in future efforts.

## Primary U.S. Work Locations and Key Partners



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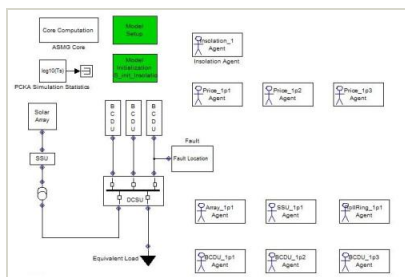
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Organizations Performing Work	Role	Type	Location
PC Krause and Associates, Inc.	Lead Organization	Industry	West Lafayette, Indiana
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Indiana	Ohio

## Images



## Briefing Chart

Simulation Environment for Power Management and Distribution Development, Phase II  
<https://techport.nasa.gov/image/131240>

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

PC Krause and Associates, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

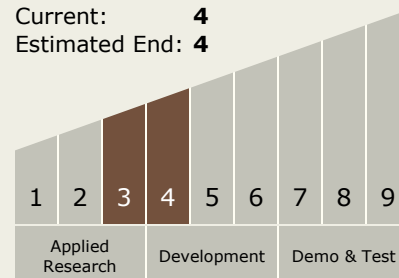
Carlos Torrez

**Principal Investigator:**

Benjamin Loop

## Technology Maturity (TRL)

Start: 3  
 Current: 4  
 Estimated End: 4



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## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.3 Power Management and Distribution
    - └ TX03.3.1 Management and Control

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System